BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)

SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

CONTENT

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
Details of Main and Allied Papers (Effective from 2010-2011)

Name of the Course: B..Sc. **Name of the Discipline: Physics**

Sl. No	Paper	Code	TITLE OF THE PAPER
1	Paper 1	B0201	**Mechanics of Particles, Rigid Bodies and Continues Media**
2	Paper 2	B0202	**Kinetic Theory and Thermodynamics**
3	Paper 3	B0203	**Oscillations and Waves**
4	Paper 4	B0204	**Acoustics and Statistical Physics**
5	Paper 5	B0205	**General Practical-I**
6	Paper 5	B0206	**Optics**
7	Paper 6	B0207	**Electricity**
8	Paper 7	B0208	**Magnetism and Electrodynamics**
9	Paper 8	B0209	**Electronics**
10	Paper 9	B0210	**General Practical-II**
11	Paper 10	B 0211	**Quantum Mechanics**
12	Paper 11	B0212	**Solid State Physics**
13	Paper 12	B0213	**Laser and Molecular Spectroscopy**
14	Paper 13	B0214	**Advanced Electronics**
15	Paper 14	B0215	**Fundamentals of Microprocessors & Computers**
16	Paper 15	B0216	**Atomic Physics and Relativity**
17	Paper 16	B0217	**Nuclear Physics**
18	Paper 17	B0218	**Communication Electronics and Space Physics**
19	Paper 18	B0219	**Environmental Physics**
20	Paper 19	B0220	**General practical -III**
21	Paper 20	B0221	**Electronics Practical**
22	Paper 1	B0281	**Allied Physics for Chemistry Main**
23	Paper 2	B0282	**Allied Physics for Chemistry Main**
24	Paper 3	B0283	**Allied Practical Physics for Chemistry Main**

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
Course Structure and Scheme of Examination (Effective from 2010-2011)

Name of the Course: B.Sc. **Name of the Discipline: Physics**

Semester No.	Part	Paper	Code	Title of the paper	Hours of Inst/week		Exam Duration in hours	Marks		Total
					Theory	Practical		CIA	ESE	
1	Part 1	Paper 1	B9201 / B9301 / B9501	Language : Paper 1	6		3	20	80	100
	Part 2	Paper 1	B9001	English : Paper 1	6		3	20	80	100
	Part 3	Paper 1	B0201	Mechanics of Particles, Rigid Bodies and Continues Media	4	2	3	20	80	100
	Part 3	Paper 2	B0202	Kinetic Theory and Thermodynamics	4	2	3	20	80	100
	Part 3	Paper 1	B0181	Allied Mathematics Paper-1	6		3	20	80	100
2	Part 1	Paper 2	B9202 / B9302 / B9502	Language : Paper 2	6		3	20	80	100
	Part 2	Paper 2	B9002	English : Paper 2	6		3	20	80	100
	Part 3	Paper 3	B0203	Oscillations and Waves	4	2	3	20	80	100
	Part 3	Paper 4	B0204	Acoustics and Statistical Physics	4	2	3	20	80	100
	Part 3	Paper 5	B0205	General Practical-I		4	3	20	80	100
	Part 3	Paper 2	B0182	Allied Mathematics Paper-2	6		3	20	80	100
3	Part 1	Paper 3	B9203 / B9303 / B9503	Language : Paper 3	6		3	20	80	100
	Part 2	Paper 3	B9003	English : Paper 3	6		3	20	80	100
	Part 3	Paper 5	B0206	Optics	4	2	3	20	80	100
	Part 3	Paper 6	B0207	Electricity	4	2	3	20	80	100
	Part 3	Paper 1	B0381	Allied Chemistry Paper-1						
	Part 3	Paper 1	B0383	Allied Chemistry Practical-1						
4	Part 1	Paper 4	B9204/ B9304/ B9504	Language : Paper 4	6		3	20	80	100
	Part 2	Paper 4	B9004	English : Paper 4	6		3	20	80	100
	Part 3	Paper 7	B0208	Magnetism and Electrodynamics	4	2	3	20	80	100
	Part 3	Paper 8	B0209	Electronics	4	2	3	20	80	100
	Part 3	Paper 9	B0210	General Practical-II		4	3	20	80	100
	Part 3	Paper 2	B0382	Allied Chemistry Paper-2						
	Part 3	Paper 2	B0384	Allied Chemistry Practical-2						
5	Part 3	Paper 10	B 0211	Quantum Mechanics	4	2	3	20	80	100
	Part 3	Paper 11	B0212	Solid State Physics	4	2	3	20	80	100
	Part 3	Paper 12	B0213	Laser and Molecular Spectroscopy	4	2	3	20	80	100
	Part 3	Paper 13	B0214	Advanced Electronics	4	2	3	20	80	100
	Part 3	Paper 14	B0215	Fundamentals of Microprocessors & Computers	4	2	3	20	80	100
6	Part 3	Paper 15	B0216	Atomic Physics and Relativity	5	2	3	20	80	100
	Part 3	Paper 16	B0217	Nuclear Physics	5	2	3	20	80	100
	Part 3	Paper 17	B0218	Communication Electronics and Space Physics	5	3	3	20	80	100
	Part 3	Paper 18	B0219	Environmental Physics	5	3	3	20	80	100
	Part 3	Paper 19	B0220	General practical -III		5	3	20	80	100
	Part 3	Paper 20	B0221	Electronics Practical		5	3	20	80	100
3	Part 3	Paper 1	B0281	Allied Physics for Chemistry Main	4	2	3	15	60	75
4	Part 3	Paper 2	B0282	Allied Physics for Chemistry Main	4	2	3	15	60	75
4	Part 3	Paper 3	B0283	Allied Practical Physics for Chemistry Main		2	3	10	40	50

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
Question Paper Pattern For Main Papers

Course: B.Sc., (Physics) **Duration: 3 Hours**

Title of the Paper: For all Main Paper **Max. Marks: 80**

Section	No. of Question	No. of Questions	Marks	Total
	To be Asked	To be answered		
A	12	10	2	20
B	7	5	6	30
C	5	3	10	30
			Total	80

Special Instructions:
Note 1: Questions should be distributed uniformly in all the units.
Note 2: Problem may be included upto a maximum of 20%

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
Question Paper Pattern For Allied Papers

Course: B.Sc., (Chemsity) **Duration: 3 Hours**

Title of the Paper: Allied Physics for Chemistry Main **Max. Marks: 60**

Section	No. of Question	No. of Questions	Marks	Total
	To be Asked	To be answered		
A	10	8	2	16
B	7	5	4	20
C	5	3	8	24
			Total	60

Special Instructions:
Note 1: Questions should be distributed uniformly in all the units.

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SEMESTER : I **PAPER CODE : B0201**

MAIN PAPER I

MECHANICS OF PARTICLES, RIGID BODIES & CONTINUOUS MEDIA

UNIT - I: *16 hours*

Newton's laws of motion - Forces of nature - Centripetal and Coriolis accelerations - Kepler's laws of planetary motion - Newton's law of gravitation - deduction from Kepler's law-determination of mass of a planet - determination of G by Boy's method.

Inertial and gravitational mass - equipotential surface - Gravitational field and potential due to a uniform spherical shell, solid sphere - Gravitational self energy of a solid sphere .

UNIT - II: *14 hours*

Motion of centre of mass - expressions for velocity and acceleration -Two body problem - reduced mass - binary stars - Law of conservation of energy, liner momentum and angular momentum.

Elastic and Inelastic collisions - laws of collision-coefficient of restitution - Direct and oblique collision - expression for final velocities and loss of energy- Impact parameter and Scattering cross section.

UNIT - III: *14 hours*

Rigid body- translational and rotational motions - Torque and Impulse - Equation of motion for rotation - Rotational energy states of a diatomic molecule - Moment of inertia - radius of gyration - theorems on moment of inertia - Calculation of moment of inertia of a solid sphere and hollow sphere - Precessional motion- top & gyroscope (qualitative ideas only).

UNIT - IV: *14 hours*

Torsion of a cylinder - work done in twisting a wire - determination of rigidity modulus of a wire - dynamic method - Bending of a beam - bending moment – cantilever - depression of beams - determination of Young's modulus by non-uniform bending - I shape of girders

UNIT - V: *14 hours*

Viscous fluids - streamline and turbulent flow - Reynold's number - Equation of continuity - Bernoulli's theorem – Venturimeter - Poiseuille's equation for flow through a capillary tube - Stoke's law.

Surface tension and surface energy–molecular interpretation - excess pressure inside a curved surface – surface tension and interfacial tension by Drop weight method - Factors affecting surface tension.

TEXTBOOKS:

1. Elements of Mechanics, Gupta, Prakash and Agarwal, Pragathi Prakashan, 2006.
2. Dynamics, M. Narayanamurthi, National Publishing House, 2002.
3. Properties of Matter, D.S.Mathur, S.Chand & Co, 2004.

REFERENCE BOOKS:

1. Physics,Volume - I, Resnik & Halliday, John Wiley, 2005.
2. Feynman lectures on Physics, Volume - I, Narosa , 1986.

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SYLLABUS FOR THE B. Sc (PHYSICS)

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SEMESTER : I **PAPER CODE : B0202**

MAIN PAPER II

KINETIC THEORY & THERMODYNAMICS

UNIT - I: *14 hours*

Review of the kinetic model of an ideal gas – pressure of a gas- interpretation of temperature - Equipartition of energy - specific heats of gases. Van der Waals model - equation of state - critical constants. Mean free path - transport of momentum (viscosity), of energy (thermal conduction) and matter (diffusion).

UNIT - II: 16 *hours*

Porous plug experiment- Joule-Thomson effect-theory of Joule-Thomson effect - principles of regenerative and cascade cooling-liquefaction of air, H_2, O_2 and He-adiabatic demagnetization-theory-measurement of low temperature-He vapour pressure thermometer.

UNIT - III: *14 hours*

Thermal equilibrium - Zeroth law- indicator diagrams and work done - internal energy - the first law - Carnot engine and its efficiency- Carnot's theorem – Carnot's engine as refrigerator - second law - Entropy – entropy change in reversible and irreversible processes- Principle of increase of entropy -Thermodynamic scale of temperature - third law of thermodynamics.

UNIT - IV: *14 hours*

Maxwell's equations - application to Clausius-Clapeyron equation. Thermodynamic potentials - Relation to thermodynamic variables - equilibrium in thermodynamic systems (First order phase changes only).

UNIT – V: *14 hours*

Stefan - Boltzmann law (theory) – Newton's law of cooling from Stefan's law - spectral distribution of black body – experiment - Wien's displacement law - Rayleigh-Jeans law - Planck's hypothesis - mean energy of an oscillator and Planck's law.

TEXTBOOKS:

1. Heat and thermodynamics, Brijlal and Subramanian, S. Chand & Co, 2004.
2. Heat and thermodynamics, Mathur, S. Chand & Co, 1986.
3. A Textbook of Heat and thermodynamics, J.B. Rajam and C.L. Arrora, 1976.

REFERENCE BOOKS:

1. Heat, Thermodynamics and Statistical Physics, Singal, Agrawal etal, Pragati Prakashan, 2007.
2. Thermal Physics, C. Kittel and H. Kroemer, CBS Publishers, Delhi, 2004.
3. Heat and Thermodynamics, M.W. Zemanasky, McGraw-Hill, 1986.

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SEMESTER : II **PAPER CODE : B0203**

MAIN PAPER III

OSCILLATIONS AND WAVES

UNIT-I: *16 hours*

Simple Harmonic Motion- nature of small oscillations in one dimensional potential well- potential energy curve - equilibrium-mass between two spring systems-longitudinal and transverse oscillations - vibrational states of a diatomic molecule-reduced mass.

Damped oscillations-critical damping-Q of an oscillator-Forced oscillations-transient and steady state oscillations-low and high frequency responses.

UNIT-II: *14 hours*

Two dimensional oscillator-normal co-ordinates and normal modes –Fourier series-evaluation of Fourier coefficients-application to square wave, saw tooth wave and plucked string.

UNIT-III: *14 hours*

Wave motion-characteristics of wave motion-differential equation of wave motion-Stationary and Progressive waves- energy of a progressive wave-Particle velocity and wave velocity –boundary conditions.

UNIT-IV: *14 hours*

Speed of transverse wave in a uniform string-speed of longitudinal waves in a fluid-group velocity and phase velocity- dispersive waves-dispersion relation.

UNIT-V: *14 hours*

Linear homogeneous equations and super position principle -Interference of sound waves-condition for Interference of sound waves-energy distribution – Beats- analytical treatment of Beats-combination tones.

Ultrasonics- production- Piezo-electric oscillator-Magnetostriction method- detection - Piezo-electric method- applications.

TEXT BOOKS:

1. Waves and Oscillations, N.Subramanyam and Brij Lal, Vikas Publishing House, 2001.
2. A Text Book on Ocillations,Waves & Acoustics, M.Ghosh & D.Bhattacharya, S. Chand & Co., 2006.
3. Elements of Mechanics, Gupta, Prakash, etal., Pragati Prakashan, 2006.

REFERENCE BOOKS:

1. Waves and Oscillations, N.K.Bajaj, TMH, 2004.
2. Oscillations and Waves, Satya Prakash, Pragati Prakashan, 2005.
3. Mechanics, D.S.Mathur, S.Chand & Co., 2005.

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SEMESTER : II **PAPER CODE : B0204**

MAIN PAPER IV

ACOUSTICS AND STATISTICAL PHYSICS

UNIT - I: 12 *hours*

Vibrations in bounded systems: Normal modes of a bounded system; harmonies - the quality of sound - Chladni's figures, vibration of a drum. - Limits of human audibility - intensity and loudness - bel and decibel. Concord and discord - Musical scale - diatonic & tempered scale –temperament.

UNIT - II: *14 hours*

Acoustic impedance of a medium - percentage reflection and refraction at a boundary, Diffraction of sound; principle of a sonar system, sound ranging.

Acoustic transducer and their characteristics - recording and reproduction of sound in cine-films -The acoustics of halls – condition for good acoustic halls - reverberation period - Sabine's formula.

UNIT - III: *16 hours*

Probability and thermodynamic probability - principle of equal a priory probabilities – general expression for probability – sterling's formula - probability distribution - its narrowing with increasing n – macro and micro states - accessible and inaccessible states - Phase space representation - The mu space – division of space phase - ensembles and types of ensembles.

UNIT - IV: *16 hours*

Maxwell- Boltzmann distribution law - Thermal equilibrium between two systems -beta parameter and its identify with $(kT)^{-1}$ - probability and entropy - Boltzmann entropy relation - equipartition of energy, Maxwellian distribution of speeds in an ideal gas - Derivation of the distribution of speed and velocities.

UNIT - V: *14 hours*

Indistinguishability and symmetry of particles - Bose-Einstein statistics & Fermi-Dirac statistics – applications to electron and photon gas (qualitative ideas only) - Comparison between the three statistics.

TEXTBOOKS:

1. A Text Book on Ocillations,Waves & Acoustics, M.Ghosh & etal, S. Chand & Co., 2006.
2. Heat and thermodynamics, Mathur, S. Chand & Co., 1986.
3. Elements of statistical mechanics, Kamal Singh, S.P. Singh, S. Chand & Co., 1988.
4. A Text book of Heat and thermodynamics, J.B.Rajam, S. Chand & Co., 1976.

REFERENCE BOOKS:

1. Berkeley Physics Course, Vol. 3, Statistical Physics, F. Reif, 1976.
2. Introduction to Statistical Physics, B.B. Laud, MacMillan, 1981.
3. Heat, Thermodynamics and Statistical Physics, Singal, Agrawal etal, Pragati Prakashan, 1991.

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SEMESTER : I & II **PAPER CODE : B0205**

MAIN PAPER V

PHYSICS PRACTICAL - I

Choose any 16 experiments from the list given below

LIST OF EXPERIMENTS: ***4 hours per week***

1. Compound pendulum.- determination of g, radius of gyration and moment of inertia
2. Young's modulus - non-uniform bending - pin & microscope.
3. Young's modulus - cantilever - pin & microscope.
4. Surface tension of a liquid and interfacial surface tension between water and kerosene by the method of drops.
5. Rigidity modulus - Torsional oscillations without masses.
6. Specific heat capacity of a liquid and emissivity of a surface - method of cooling.
7. Thermal conductivity of a bad conductor - Lee's disc method.
8. Sonometer - determination of frequency and verification of laws of transverse vibrations.
9. Melde's apparatus - determination of frequency.
10. Spectrometer - refractive index of a liquid - hollow prism.
11. Spectrometer - calibration of a grating - minimum deviation method.
12. P.O. box - resistivity and verification of laws of resistance.
13. P.O. box - temperature coefficient of the material of a coil of wire.
14. Potentiometer - calibration of low range voltmeter (0 - 1.5 V).
15. Potentiometer - calibration of ammeter (0-1.5 amps).
18. Variation of period of oscillations of a spring (or rubber band) with mass and spring constant
20. Study of characteristics of a thermistor
21. Emf of thermocouple using digital multimeter
22. Kater's pendulum - determination of acceleration due to gravity at a place
23. Stoke's method of viscosity determination
26. Computer simulation of Equations of motion for a system of particles
27. Computer simulation of Molecular rotations, as rigid bodies
28. Computer simulation of Study of coupled oscillations -
29. Computer simulation of analyzing a given wave-form for its harmonic components.
30. Computer simulation of Generation of phase space plots of simple harmonic oscillator

TEXTBOOKS:

1. Practical Physics and Electronics, C.C. Ouseph & etal, S.Visawanathan Pvt. Ltd., 2002.
2. Practical Physics, M.N.Srnivasan & etal, Sultan Chand and Sons, 2005.
3. B.Sc. Practical Physics, C.L.Arora, S.Chand and Co., 2004.

REFERENCE BOOKS:

1. Practical Physics, G. L. Squires, Cambridge University Press, III edition, 1985.
2. Physics through Experiments (Vol –II), Saraf et al, Vikas Publications, 1999.
3. A Textbook of Practical Physics, H.P. Shrivastava, ABD Publishers, 2006.

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SEMESTER : III **PAPER CODE : B0206**

MAIN PAPER VI

OPTICS

UNIT - I: *12 hours*

Principle of least time- cardinal points of an optical system-principal foci and focal planes-principal points and principal planes-nodal points-coaxial lens system-thick lens-chromatic aberrations-achromatic combination of lenses in contact and separated lenses- monochromatic aberrations and their reduction.eye pieces -Ramsden and Huygens eye pieces.

UNIT - II: *16 hours*

The principle of superposition - two-slit interference – coherence requirements for the sources - Young's experiment – theory – interference in thin films (reflected light only) – wedge shaped thin films-theory – testing for optical flatness - Michelson interferometer - its use in the determination of wavelength, wavelength difference and standardization of the meter - Fabry-Perot interferometer and etalon.

UNIT - III: *16 hours*

Fresnels assumptions-half-period zones-rectilinear propagation of light-zone plate- action of zone plate-Fresnel diffraction at circular aperture and straight edge-Fraunhofer diffraction at a single slit-at N parallel slits-plane diffraction grating-wavelength determination-concave reflection grating-Rayleigh's criterion-resolving power of a plane diffraction grating, prism and telescope.

UNIT - IV: *14 hours*

Double refraction - definition - uniaxial and biaxial crystals– Huygen's explanation of double refraction in uniaxial crystals (case of optic axis in the plane of incidence and inclined to the crystal surface only)-quarter wave plate and half wave plate -distinction between them- uses -optical activity -Biot's law of optical rotation- Fresnel's theory of optical rotation(no derivation)- specific rotation - Laurent's half shade polarimeter

UNIT - V: *14 hours*

Dispersion - dispersive power of a prism - normal and anomalous dispersion - Cauchy's equation and Hartmann's formula - Sellmeir's formula - Lorentz electromagnetic theory of dispersion – different types of scattering (qualitative ideas only).

TEXTBOOKS:

1. Optics, Brijlal and Subramanian, S. Chand & Co., 2005.
2. Optics, S.L.Kakani and H.C. Bhandrai, Sultan Chand & Co., 2005.
3. Principles of Optics, B. K. Mathur, New Gopal Printing Press, 1988.

REFERENCE BOOKS:

1. Optics, Ajoy Ghatak , Macmillan India Ltd., 2005.
2. Fundamental of Optics, Jenkins and White, McGraw-Hill, 1982.
3. Optics, Smith and Thomson, John Wiley and Sons, 1980.
4. Geometrical and Physical Optics, R.S. Longhurst, Longmans, 1966.
5. Optics & spectroscopy, R. Murugesan, S.Chand & Co., 2005.

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SEMESTER : III **PAPER CODE : B0207**

MAIN PAPER VII

ELECTRICITY

(NOTE: VECTOR LANGUAGE IS TO BE USED ALL THROUGH)

UNIT - I: *12 hours*

Coulomb's law - Electric field - field due to monopole, dipole - flux of an electric field - Gauss's law – proof - Differential form of Gauss's law - applications to deduce E fields of spherical charge distribution and uniformly charged sperical conductor – coulomb's theorem - force per unit area on the surface of a charged conductor.

UNIT - II: *16 hours*

Electric potential – relation between electric field and potential – potential and field due to dipole and quadruple – potential energy of a system of charges - PE of pair of charges and charged hollow disc - Energy associated with E field - Poisson's equation, Laplace's equation, boundary conditions, and Uniqueness theorems.

Electric images - Induced charges - field and potential near a linear conductor and spherical conductor.

UNIT - III: *14 hours*

Dielectrics – polar and non polar dielectric – polarization of a dielectric – polarization vector - permittivity - susceptibility -gauss law in dielectrics – Electric field caused by polarized matter -relation connecting E, D and P - dielectric constant and dielectric strength – effect of dielectric on the capacity of a capacitor.

UNIT - IV: *14 hours*

Polarisabilities - polarisability tensor - types of polarisabilities - frequency dependence of polarisability - molecular field - Clausius - Mosatti equation - its limitation - Debye's relation & molecular structure – ferroelectric materials (general ideas).

UNIT - V: *16 hours*

Electrical current and current density -Equation of continuity - Thevenin's Theorem - Norton's theorem - Superposition theorem - maximum power theorem – Ohm's law -Non-ohmic circuitry - Thermistors - Rise and fall of currents in LR circuits - growth and decay of charge in CR circuits - time constant and its significance.

TEXTBOOKS:

1. Electricity and Magentism, K.K. Tewari, S. Chand & Co., 2005.
2. Electricity and Magentism, R. Murugesan, S. Chand & Co., 2005.
3. Electricity and Magentism, Narayanamurthy, National Publishing House, 2000.

REFERENCE BOOKS:

1. Electrodynamics, Gupta, Kumar and Singh, Pragati Prakshan, 2005.
2. Electricity and Magnetism, A.S. Mahajan and A.A. Rangawala, TMH, 1988.
3. Electricity and Magnetism, W.J. Duffin, ELBS, 1981.

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SEMESTER : IV **PAPER CODE : B0208**

MAIN PAPER VIII

MAGNETISM AND ELECTRODYNAMICS

(NOTE: VECTOR LANGUAGE IS TO BE USED ALL THROUGH)

UNIT - I: *12 hours*

Magnetic field: Magnetic field **B** seen through Lorentz force on a moving charge, unit for **B** defined through force on a straight current, torque on a current loop in **B** field, magnetic dipoles in atoms and molecules. Motion of charges in electric, magnetic and crossed fields - Principle, Construction, Working of cathode ray oscillograph (CRO)

UNIT - II: *14 hours*

Magnetic field due to currents: Biot and Savart's law. Field equations in magnetostatics, Ampere's law. Fields due to a straight wire, magnetic dipole, circular current and solenoid. Magnetic fields in matter: Magnetisation current, magnetization vector, **H** and **B** fields, magnetic permeability, susceptibility. Comparison of magneto statics and electrostatics.

UNIT - III: *16 hours*

Faraday's law for electromagnetic induction: Faraday's law in integral and differential forms; self-inductance of a solenoid and of a straight conductor, energy stored in an inductor. Displacement current; modified Ampere's law, Maxwell's equation for time-dependent electromagnetic field in vacuum, and in material media, boundary conditions.

UNIT - IV: *14 hours*

Alternating currents - Principle and working of AC generator - skin effect - series and parallel LCR circuits – series and parallel resonance - Q-factor - power dissipation and power factor - AC bridges - Balancing conditions - Andersons' bridge to find L – Wein's bridge to find C.

UNIT - V: *16 hours*

Three phase generator (basic ideas) – three phase electrical power supply - delta and star connections - Transformer – theory – distribution of three phase ac - high DC voltage generation by induction coil – dc dynamo – Dc motors – efficiency.

TEXTBOOKS:

1. Electricity and Magentism, K.K. Tewari, S. Chand & Co., 2005.
2. Electricity and Magentism, Murugeshan, S. Chand & Co., 2005.
3. Electrodynamics, S.L.Guptha, S.P. Singh, V. Kumar, Prakati Praksan, 2005

REFERENCE BOOKS:

1. Electricity and Magnetism, A.S. Mahajan and A.A. Rangawala, Tata McGraw-Hill, 1988.
2. Electricity and magnetism, Brij Lal and Subramanyam, Ratan Prakashan Mandir, 2004.
3. Electricity and magnetism, D.N. Vasudeva, S. Chand & Co., 2005.
4. Classical Electricity and Magnetism, Panofsky & Phillips, Dover Books, 2005.

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(For the students admitted from the academic year 2010 - 2011)

SEMESTER : IV **PAPER CODE : B0209**

MAIN PAPER IX

ELECTRONICS

UNIT - I: *14 hours*

Semiconductor diodes - p-n junction diode - V-I characteristics - Applications in half-wave and Bridge-rectifiers, clipper circuits, clamper circuits - Avalanche breakdown and zener breakdown -Zener diode - Zener diode as voltage regulator - opto electronic diodes – LED - photo diode - applications.

UNIT - II: *14 hours*

Bipolar junction transistors (BJT): pnp and npn structures; active and saturation regions, characteristics of BJT, common-emitter configuration - characteristics. Two-port analysis of a transistor, h-parameters, load-line concept, emitter follower, biasing methods (base bias and voltage divider bias), stability factor, low frequency model.

UNIT - III: *16 hours*

Cascade connections in amplifiers -Theory and Frequency response of RC and transformer coupled amplifiers; bandwidth, decibel power gain and loss.

Field effect transistor (FET) - Classification of FETs, construction and working of junction field-effect transistor, - characteristics of JFET, biasing of JFET, operating regions, pinch-off voltage, metal-oxide-semiconductor transistor (MOS transistor) - construction, working and characteristics of d-MOSFET and e-MOSFET- CMOS (basic ideas).

UNIT - V: *16 hours*

Power amplifiers – types of audio power amplifiers – distortion – class A power amplifier- class B push-pull amplifier.

Feddback in amplifiers – negative and Positive feedback – advantages of negative feedback-Barkhausen criterion – theory of working of Colpitt's oscillator, Hartley oscillator and phase shift oscillator - crystal oscillators – Multivibrator (basic ideas).

UNIT - IV: *12 hours*

Operational amplifiers - Differential amplifiers - principles of operational amplifiers – ideal and practical opamps - offset parameters -differential gain – CMRR – inverting and non-inverting amplifiers - application of operational amplifiers as integrator , differentiator – comparator.

TEXTBOOKS:

1. Basic Electronics, B.L. Theraja, S. Chand & Co., 2005.
2. Applied electronics, R.S. Sedha, S. Chand & Co., 2005.
3. Integrated Electronics, Milliman & Halkias, Tata McGraw-Hill, 2002.

REFERENCE BOOKS:

1. Microelectronics, Millman and Grabel, McGraw-Hill, 2002.
2. Electronic Devices: Circuits and Applications, W.D. Stanley, Prentice-Hall, 2004.
3. Electronic Circuits, L. Schilling and Belove, McGraw-Hill, 2004.
4. Principles of electronics - V.K. Metha, S. Chand & Co., 2005.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)

SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : III & IV **PAPER CODE : B0210**

MAIN PAPER X

PHYSICS PRACTICAL - II

Choose any 18 experiments from the list given below.

LIST OF EXPERIMENTS : *4 hours per week*

1. Young's modulus - Uniform bending - scale & telescope
2. Rigidity modulus - Torsional pendulum with masses.
3. Rigidity modulus - Static torsion.
4. Specific latent heat of fusion of ice.
5. Specific Heat capacity of a liquid - Joule's calorimeter.
6. Spectrometer- determination of wavelength - Minimum deviation method.
7. Spectrometer calibration of grating - Normal incidence method.
8. Spectrometer - i-d curve.
9. M and B_H - using deflection and vibration magnetometer.
10. Field along the axis of the circular coil carrying current and determination of B_H.
11. Carry-Foster's bridge - Resistivity of the material of the coil of wire.
12. Potentiometer -Calibration of a high range voltmeter.
13. Figure of merit of a periodic moving coil galvanometer.
14. B.G - Comparison of emf of two cells.
15. B.G. - Comparison of capacities.
16. Newton's rings – determination of focal length of plano-convex lens.
17. V-I Characteristics of junction and zenor diodes.
18. Construction of power pack with bridge rectifier.
19. Transistor characteristics – CE mode.
20. Clipping and Clamping Circuits.
21. Hartley oscillator – frequency measurement and determination of self inductance of tank circuit.
22. Study of optical rotation by solutions.
23. Study of the rise and decay of current in a RC circuit
24. Study of the rise and decay of current in a LR circuit
25. Study of the impedance of an inductor at varying frequencies to measure R and L
26. Study of the impedance of a capacitor of varying frequencies to measure C.
27. Study of CRO, Frequency counter and Multimeter.
28. computer simulation of effect of magnetic and electric field on charged particles
29. computer simulation of propagation of electromagnetic waves
30. computer simulation of multiple beam interference

TEXTBOOKS:

1. Practical Physics and Electronics, C.C. Ouseph & etal, S.Visawanathan Pvt. Ltd., 1999.
2. Practical Physics, M.N.Srnivasan & etal, Sultan Chand and Sons, 2005.
3. B.Sc. Practical Physics, C.L.Arora, S.Chand and Co., 2004.

REFERENCE BOOKS:

1. Experiments in Modern Physics, Adrian C. Melissinos, Academic Press, II Edition, 2003.
2. Practical Physics, G. L. Squires, Cambridge University Press, III edition, 1985.
3. Physics through Experiments (Vol –II), Saraf et al, Vikas Publications, 1999.

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SYLLABUS FOR THE B. Sc (PHYSICS)

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SEMESTER : V **PAPER CODE : B0211**

MAIN PAPER XI

QUANTUM MECHANICS

UNIT - I: *14 hours*

Distribution of energy in the spectrum of black body - Failure and limitations of Wien's law and Rayleigh - Jean's law (no derivations) - Planck's quantum theory and its features (Qualitative ideas only) - Laws of photo electric effect - Failure of classical physics - Einstein's explanation - Bohr's theory of hydrogen atom (Qualitative ideas) - its limitations – Compton effect (theory and experiment) - Drawbacks of old quantum theory.

UNIT - II: *14 hours*

Dual character of light - De Broglie's hypothesis - Matter waves - De Broglie wave length - wave velocity, group velocity of de Broglie waves - wave packets - Davisson and Germer's experiment - G.P. Thomson's experiment- Consequences of De Broglie concepts - Principle and working of electron microscope

UNIT - III: *16 hours*

Heisenberg's uncertainty principle – thought experiment and elementary proof – non exixtance of electrons inside the nucleus - Schrödinger's one-dimensional time - dependent wave equation - Schrödinger's one-dimensional time-independent wave equation - physical significance of wave function - orthogonal and normalized wave functions - Eigen function , eigen value and eigen value equation.

UNIT - IV: *12 hours*

Bohr's correspondence principle - postulates of quantum mechanics – operators – operators foe momentm, angular momentum, kinetic energy, total energy, - Hamilitonian and Hermtion operators - expectation values –free particle - particle in a one-dimensional box - one-dimensional simple harmonic oscillator .

UNIT - V: *16 hours*

Reflection at a step potential - transmission across a potential barrier - Tunnel effect - its applications - - Emission of α - particle from radioactive elements - Hydrogen atom –separation of variables – azimuthal, polar and radial wave equations- solution of radial equation in the ground state.

TEXTBOOKS:

1. Elements of quantum mechanics, Kamal Singh and S.P. Singh, S.Chand & Co., 2005,
2. Quantum Mechanics, S.P. Singh and M.K. Bagde, S. Chand & Co., 1990.
3. Modern Physics, R. Murugesan, S.Chand & Co., 2005.

REFERENCE BOOKS:

1. Quantum Mechanics, Satyaprakash and C.K. Singh, Kedarnath Ram Nath & Co., 1991.
2. Quantum Mechanics, Ghatak and Loganathan, TMH, 1989.
3. Quantum Mechanics, G. Aruldas, PHI, 2005.
4. A Text book of Quantum Mechanics, P.M. Mathews and K. Venkatesan, TMH, 1991.

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SYLLABUS FOR THE B. Sc (PHYSICS)
(For the students admitted from the academic year 2010 - 2011)

SEMESTER : V **PAPER CODE : B0212**

MAIN PAPER XII

SOLID STATE PHYSICS

UNIT-I: *14 hours*

Crystal lattice –translation vectors-Basis-Unit cell-Primitive cell-Lattice parameters-crystal planes-Miller indices—Lattice types-co-ordination number-Packing fraction-symmetry elements and symmetry operations-point group and space groups.

X-ray diffraction-Bragg's law-Bragg's X-ray spectrometer-Rotating crystal method-Vibrations of one-Dimensional Monoatomic Lattice-one-Dimensional diatomic Lattice-Phonons and their characteristics

UNIT-II: *16 hours*

Types of chemical bonding-Ionic and Covalent Metallic,Vanderwall's and Hydrogen bonding and their properties-expression forLattice energy of ionic crystal-Madelung constant-specific heat capacity-Einstein's theory of specific heat capacity-Debye's theory of specific heat capacity.

UNIT-III : *14 hours*

Free electron gas - Drude- Lorentz theory-Conductivity,Resistivity and Mobility Weidemenn-Franz law –Lorentz number –Sommer field's free electron theory-Fermi function-Density of energy states(1-D)- Expression for Fermi energy-Hall effect in metals-Hall coefficient-Hall angle- applications of Hall effect-determination of Hall coefficient.

UNIT-IV: *14 hours*

Bands in solids -Bloch theorem-Division of conductors, insulators and semiconductors on the basis of energy band diagram- carrier concentration and Fermi level for Intrinsic and Extrinsic semiconductors

UNIT-V: *14 hours*

Zero restivity and perfect diamagnetism-critical temperature and field-Meissner effect-type-I and type-II super conductors-Josephson effect- Nanophase materials-definition-properties-general applications.

Liquid crystals-Thermotropic liquid crystal: Nematics, Cholesterics and Smectics-Lyotropic liquid crystal-application to LCD (basic ideas).

TEXT BOOKS:

1. Solid state physics, S.O.Pillai, Sixth edition, New age international publishers, 2006,
2. Solid state physics, Gupta and Kumar, K. Nath & Co., Meerut, 2005.
3. Solid state physics, Saxena & etal, Pragathi Prakashan, 2006.

REFERENCE BOOKS:

1. Introduction to Solid state physics, C. Kittel, Seventh edition, Wiley India, 2004.
2. Solid State Physics, W. Ashcroft & N. David Mermin, Holt, Rinehart and Winston, 1976 .
3. Elementary Solid State Physics, M. Ali Omar, Addison-Wesley Pub. Co., 1993

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SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : V **PAPER CODE : B0213**

MAIN PAPER XIII

LASERS AND MOLECULAR SPECTROSCOPY

UNIT - I: *14 hours*

Purity of a spectral line - coherent length and coherent time (Basic concepts only) - spatial coherence - temporal coherence - Absorption of light - Spontaneous & stimulated emission - Einstein's **A** and **B** coefficients - conditions for light amplification and for large stimulated emissions - population - concept of population inversion - pumping - pumping methods - Active medium - Meta stable states.

UNIT - II: *16 hours*

Pumping schemes - Two level, three level and four level pumping schemes - Types of Lasers - Design and Operation of: He-Ne Laser - Tunable dye laser - semiconductor diode laser - concepts of quantum-well & Excimer lasers. - Applications of lasers in holography

UNIT - III: *14 hours*

Molecular spectrum - Translational, rotational and vibrational energies of a molecule - types of molecules and their moments of inertia - types of molecular spectra - The intensity of spectral lines - the width of spectral lines - Line broadening (Natural broadening, collision broadening & Doppler broadening) - Rotational spectrum - The rigid diatomic molecule - non-rigid rotator and its spectrum - spectrum of carbon mono-oxide.

UNIT - IV: *14 hours*

Modes of vibrations of a molecule - IR absorption spectroscopy - Regions of IR - Fingerprint region - conditions for absorption of IR radiation - Description and working of a double beam IR spectrophotometer - Fourier transform IR spectroscopy (no derivation) Applications of IR spectroscopy to elucidate molecular structure - simple examples (H_2O, CO_2 , NO_3).

UNIT - V: *14 hours*

Raman effect - stokes and anti stokes lines - Classical & Quantum theory of Raman effect – Laser as Raman source - Design and working of Laser Raman spectrophotometer - Types of Raman spectrum - Rule of mutual exclusion - general applications of Raman spectrum to study molecular structure - examples of CO_2, N_2O, H_2O and SO_2 - comparison between IR and Raman spectra.

TEXTBOOKS:

1. An introduction to Lasers, M.N. Avadhanulu, S. Chand & Co., 2001.
2. Fundamentals of Molecular spectroscopy, C.N. Banwel, TMH, 2002.
3. Spectroscopy, Gurdeep & Chatwal, Himalaya Publishing House, 2002.

REFERENCE BOOKS:

1. Laser Fundamentals, W.T. Silfvast , Cambridge University Press, 2000.
2. Instrumental methods of analysis, Willard etc., Narosa, 1986.
3. Spectroscopy, B.K. Sarma, Krishna Prakashan, 2004.
4. Essential of lasers and Non-linear optics, G.D. Baruah, Pragati Prakeshan, 2000.
5. Lasers and non-linear optics, B.B. Laud, New age, 2002.

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SYLLABUS FOR THE B. Sc (PHYSICS)

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SEMESTER : V **PAPER CODE : B0214**

MAIN PAPER XIV

ADVANCED ELECTRONICS

UNIT -I: *12 hours*

Number system, binary arithmetic, Basic gates and universal gate operations - Boolean algebraic theorems and properties - Karnaugh map - two , three and four variable map, POS and SOP simplification, NAND and NOR implementation, don't care conditions.

UNIT-II: *16 hours*

Logic families: characteristics and parameters, TTL gates, TTL open collector gates, CMOS gates, TTL - CMOS interface, Combinational logic design: parity checker, half and full adders, demultiplexer, multiplexer, decoders, Encoders, PAL.

UNIT-III: *16 hours*

RS flip-flops, clocked RS flip-flop, edge-triggering, JK flip-flop, D-type flip-flops, JK master slave flip-flop, - serial-in-serial out, serial-in-parallel out shift registers; asynchronous counters; decade counter (Mod 10 counter) - NE 555 timer in astable mode.

UNIT-IV: *14 hours*

Memory concepts, ready only memories (ROMs), simple application, Programmable ROMs (PROMs and EPROMs), Random access memories (RAMs) - Static and Dynamic RAMs- memory expansions.

UNIT-V: *14 hours*

Principle of variable network and binary ladder type: four-bit D/A converter, A/D converter, counter method and successive approximation; resolution and accuracy of D/A and A/D converter, frequency counters, digital voltmeters.

TEXTBOOKS:

1. Digital Principles and Applications, Malvino & Leach, Tata McGraw-Hill, 2004.
2. Modern Digital Electronics, R.P. Jain, Tata McGraw-Hill, New Delhi, 2003.
3. Digital logic and computer design, M Morris Mano, Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. Integrated Electronics, Milliman & Halkias, Tata McGraw - Hill, 1976.
2. Digital fundamentals, Floyd L. Thomas, Universal Book stall, New Delhi, 2004.
3. Digital Electronics, Tokheim, McGraw-Hill Int, 1998.
4. A Textbook of Digital Electronics, R.S. Sedha, S. Chand & Co., 2004.

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SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : V **PAPER CODE : B0215**

MAIN PAPER XV

FUNDAMENTALS OF MICROPROCESSORS & COMPUTERS

UNIT - I: *16 hours*

Classification of Computers - Components of computers: Central processing unit-Input and Output devices-Types of Computer memory-Storage devices- -Magnetic disc- Optical technology-Flash memory - Software: System software- Operating system-Importance of operating system-Popular operating systems-Windows, Mac, Unix and Linux. (Basic ideas only). Applications of computers-Education, Space research, Meteorology and Communication.

UNIT - II: *14 hours*

Network fundamentals - Types of network- LAN, MAN & WAN. Internet and Intranet-History of Internet-Internet Tools-World Wide Web-Search Engine-Multimedia- applications- -Virus-Virus detection & Control Systems- Application software -Microsoft word, Excel, Power Point (Basic Ideas only)

UNIT - III: *16 hours*

Programming Languages: Overview of Programming Languages -Development of Programming Languages- Applications-Advantages and Disadvantages of HLL.

"C" Language: Introduction to C- Data types-operators - expressions-control structures-arrays-functions - simple programs - Adding two numbers-Converting from centigrade to Fahrenheit (expression) - Finding the largest number among N numbers (array) - Finding factorial of a number using functions - To check whether a given string is a palindrome or not

UNIT - IV: *14 hours*

Evolution of microprocessors & Architecture - 8085 microprocessor–Pin configuration- Internal architecture (Block diagram)- Address, data and control bus lines - Instruction formats -Addressing modes.

UNIT - V: *12 hours*

Classification of instructions in 8085- Data transfer instructions-arithmetic & logical instructions - Loop instructions. Interrupts in 8085- Interrupt instructions. Simple programs: Addition, subtraction, multiplication and division.

TEXTBOOKS:

1. Introduction to Information Technology, ITL Education Solutions, Pearson, New Delhi,2006.
2. Programming in ANSI C, Balagurusamy, TMH, New Delhi, 2000.
3. Microprocesor Architecture, Programming and Applications with the 8085, Ramesh S. Gaonkar, Penram International, Mumbai, 1999.

REFERENCE BOOKS:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, PHI, New Delhi, 2006.
2. Programming With C, Schaum's Outlines Series, Byron S. Gottfried, TMH, New Delhi, 2006.
3. Fundamentals of Microprocessor-8085 Architecture, Programming and interfacing, S V.Vijayendran, Viswanathan printers, Chennai, 2002.

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SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : VI **PAPER CODE : B0216**

MAIN PAPER XVI

ATOMIC PHYSICS AND RELATIVITY

UNIT - I: *20 hours*

Sommerfield's atom model - elliptical orbit and relativistic correction – vector atom model – quantum numbers – coupling schemes – Pauli's exclusion principle – arrangement of elements in periodic table - critical potential - excitation potential - Frank - Hertz experiment Electron spin - Stern and Gerlach experiment.

UNIT - II: *15 hours*

Normal and anomalous Zeeman effect - theory and experiment - gyro magnetic ratios for orbital and spin motions - Lande's 'g' factor - Pachen - Back effect - Simple Theory and experiment- Stark effect - (experimental study only).

UNIT - III: *15 hours*

Positive rays – Thompson's parabola method – Aston mass spectrograph – velocity selector – Bainbridge mass spectrograph – magnetic focusing – Dembster's mass spectrograph.

UNIT - IV : 20 hours

Frame of reference - Newtonian relativity - Galilean transformations - Lorentz transformations - application of G.T. to Mechanics - Michelson - Morley experiment - Einstein's basic postulates - length contraction. simultaneity, - Time dilation - Twin paradox Einstein's velocity addition rule.

UNIT - V: *20 hours*

Variation of mass with velocity - mass energy equivalence - relativistic formulae for momentum and energy - invariant mass - Minkowski's four-dimensional space - (Minkowskis space) time continuum - Four vectors - general theory of relativity - Applications - aberration of star light - Magnetism as a relativistic phenomenon.

TEXTBOOKS:

1. Modern Physics, R. Murugesan, S. Chand & Co., 2005.
2. A Primer of Special Relativity, P.L. Sardesai, New Age International, 2004,
3. Atomic Physics, S.N. Ghosal, S. Chand and Company, 2004.

REFERENCE BOOKS:

1. Concepts of Modern Physics, A. Beiser, TMH, 2004.
2. Atomic Physics, J.B. Rajam, S. Chand & Co., 1976
3. Atomic spectra, White etal., TMH, 1998.

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SEMESTER : VI **PAPER CODE : B0217**

MAIN PAPER XVII

NUCLEAR PHYSICS

UNIT - I: *15 hours*

Isotopes, isobars, isotones and isomers - nuclear size - radius and volume - nucleons and nuclear composition - Nuclear charge - Nuclear spin - Nuclear magnetic moment. Nucleons and nuclear composition - nuclear mass - Mass defect - Binding energy - stability of the nucleus – Packing fraction - semi-empirical mass formula.

Types of nuclear forces - properties of nuclear forces - Meson theory of nuclear forces - Features of liquid drop model and shell model of the nucleus - merits and demerits - Magic numbers.

UNIT - II: *20 hours*

Radioactivity – laws of radioactive disintegration and successive disintegration – secular and transient equilibrium – radio actice dating - Geiger Nuttal law – alpha ray spectra – Gamow theory of alpha decay (qualitative ideas) – beta spectra – origin – neutrino theory of beta decay.

UNIT - III: *20 hours*

Types of particle accelerators - linear accelerator - Betatron - Electron and proton synchrotrons - Ionization chamber - G-M-counters - Scintillation counters, emulsion techniques.

Nuclear reactions with examples - Q - value of the reactions - threshold energy - conservation laws - radioactive isotopes and their uses - production and detection of neutrons.

UNIT - IV: *15 hours*

Nuclear fission - chain reaction - critical size - Nuclear reactors – types of reactors - Power Breeder reactors.

Nuclear fusion - controlled thermo nuclear reactions - stellar energy - p-p cycle – CNO cycle .

UNIT - V: *20 hours*

Cosmic rays - primary and secondary cosmic rays - effects of cosmic rays – cosmic ray showers.

Particles and antiparticles - Types of nuclear particles and symmetry - Parity and parity violation - Types of quarks - Quark model - particle physics and its relation to cosmology.

TEXTBOOKS:

1. Nuclear Physics, S.N. Ghosal, 2004, S. Chand & Co.,
2. Nuclear Physics, D.C. Dayal, Himalaya Publishing House, 2002,
3. Modern Physics, R. Murugesan, S. Chand & Co., 2005.

REFERENCE BOOKS:

1. Nuclear Physics, Pandya and Yadav, K. Nath, 1986
2. Nuclear physics, Kaplan, TMH, 1976.
3. Introductory to Nuclear Physics, K S Krane, John Wiley & Sons, Ltd., 1988.
4. Nuclear physics, H.S. Hans, New Age, 2001.
5. Nuclear Physics: Principles and Applications, J.S. Lilley, John Wiley & Sons Ltd., 2001.

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SYLLABUS FOR THE B. Sc (PHYSICS)
(For the students admitted from the academic year 2010 - 2011)

SEMESTER : VI **PAPER CODE : B0218**

MAIN PAPER XVIII

COMMUNICATION ELECTRONICS AND SPACE PHYSICS

UNIT - I: *15 hours*

Amplitude modulation - modulation index – sidebands - power output -Base modulation - theory of balanced modulator - SSB generation by phase shift method. Detection - Diode detector - super-heterodyne receivers.

Frequency modulation - theory - side bands - band width - modulation percentage - the reactance modulator - FM detectors - the slope detectors.

UNIT - II: *20 hours*

Ground waves propagation - line of sight distance - reflection of radio waves by earth's surface - Space wave propagation - effect of earth's curvature - duct propagation - sky waves - layers of ionosphere - theory of Ionosphereic refraction - bending of sky waves - expression for skip-distance & maximum usable frequency.

UNIT - III: 15 *hours*

Image transmission principles - scanning, synchronization & blanking pulse -composite signal. television systems - transmission of colour information - colour TV transmitter & receiver (block diagram)

Theory of Geosynchronous Satellites - block diagram of satellite and the Earth station – transponders (block diagram) – uplink and downlink signals.

UNIT – IV: 20 hours

Solar system - General properties terrestrial & jovian planets - ring system of jovian planets - Satellites of planets - KBOs - salient features of Asteroids, Comets, Meteors, -Kupier's Proto-planet theory.

Different regions of sun and their characteristics - Constellations – stars and star clusters - absolute and apparent magnitudes of stars - Hertzsprung-Russel diagram.

UNIT – II : 20 hours

Protostar - Main-sequence of stars - Red Giants - heavy element synthesis - Supernova - White dwarfs, Chandrasekar's mass limit - Neutron stars – Pulsars - Black holes. Classification of galaxies - galaxy clusters, super clusters - Milky way galaxy - Quasars - Active galaxies.

Expanding universe - Hubble's law, Big-Bang theory-standard model, inflation.

TEXTBOOKS:

1. Communication Electronics, Deshpande etal, TMH, 2001.
2. Hand book of electronics, Gupta & Kumar, Pragati Prakashan, 2002.
3. An Introduction to Astrophysics, Baidyanath Basu, Prentice Hall of India, 1999.
4. Universe, Freedman & Kaufmann, W.H.Freman & Company, New York, 2001.

REFERENCE BOOKS:

1. Electronics Communications Systems, G. Kennedy, Tata McGraw Hill, India, 1998.
2. Astrophysics (starts and galaxies), K.D.Abhyankar, Universities press, 2001.
3. Explorations: An introduction to astronomy, Arny, Mc-Graw Hill International, 2004.

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SYLLABUS FOR THE B. Sc (PHYSICS)
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SEMESTER : VI **PAPER CODE : B0219**

MAIN PAPER XIX

ENVIRONMENTAL PHYSICS

UNIT - I: *15 hours*

Multidisciplinary nature of environmental studies - Definition, scope and importance - global environmental crisis - Need for public awareness – Institutions and human resources in environment - water resources - food resources - energy resources - Renewable and Non-renewable energy sources –Solar energy, wind energy, Hydro power and Bio fuels - Land resources.

UNIT - II: *20 hours*

Physical basis of environment - Definition of ecosystem - structural features and functions of ecosystem - Ecological pyramids - First and second laws of thermodynamics and energy flow in the ecosystem - water cycle - carbon cycle - oxygen cycle - energy cycle - forest and aquatic eco systems.

Biodiversity – Importance of bio-diversity and its conservation.

UNIT - III: *20 hours*

Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear waste disposal -Nuclear accidents - Electromagnetic pollution due to communication devices – Electronic waste and disposal – Plastic waste disposal –Solid waste management - Role of individual in the prevention of pollution.

UNIT - IV: *15 hours*

Structure of the atmosphere - composition - atmospheric pressure and its variation with altitude - Atmospheric temperature - factors affecting atmospheric temperature –Global warming and Greenhouse effect - effects of Ozone depletion –El-Nino

UNIT - V: *20 hours*

Ultraviolet spectrophotometer - Principle of particle induced X-ray emission (PIXE) and its application to environmental studies- vehicle emission meter – decibel meter.

The Constitution and environment - The Environment (protection) Act - Forest Conservation Act – International conventions on environment - Kyoto protocol.

TEXTBOOKS:

1. Environmental studies, Erach Bharucha, Universities Press, 2005.
2. Atmosphere, weather and climate, K. Siddhartha, Kisalaya Publications, 2005.
3. Environmental science and Engineering, Anubha Kaushik, New Age International, 2006.

REFERENCE BOOKS:

1. Fundamentals of Ecology, Eugene P. Odum, W.B.Saunders, London, 1971.
2. Environmental Chemisty, A.K.De , New Age International, 2005.
3. Environmental Physics, Egbert Boeker & Rienk van Grondelle, Wiley, 2000.

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SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : V & VI **PAPER CODE : B0220**

MAIN PAPER XX

PHYSICS PRACTICALS - III

Choose any 20 experiments from the list given below

LIST OF EXPERIMENTS: ***5 hours per week***

1. Air wedge: Determination of the thickness and insulation of the wire.
2. Spectrometer: Hartmann's Interpolation Formula - Determination of wavelength
3. Spectrometer: i_1 - i_2 curve and determination of refractive index.
4. Spectrometer: i_1 - i_2 curve for given angle of deviation.
5. Spectrometer: Small angled prism.
6. Spectrometer: Determination of Cauchy's constants.
7. Spectrometer: Dispersive power of the material of a prism.
8. Spectrometer: Grating - wavelength by normal incidence method.
9. Spectrometer: Dispersive and resolving power of a grating.
10. Ultrasonic velocity and compressibility of the liquids -Interferometer method.
11. Field along the axis of a circular coil - Determination of moment of a magnet
12. Field along the axis of a circular coil - Determination of B_H using Searls's vibration magnetometer.
13. Temperature co-efficient of a Thermister.
14. Potentiometer: Verification of laws of resistance and resistivity of the material of a wire.
15. Potentiometer: Resistance of the potentiometer and calibration of low range voltmeter.
16. Potentiometer: Resistance of the potentiometer and measurement of emf of a thermocouple.
17. Potentiometer: Temperature coefficient of resistance of the material of a coil of wire.
18. B.G: Current and voltage sensitivities.
19. B.G: Quantity or charge sensitivity.
20. B.G: Absolute capacity of a condenser.
21. B.G: Comparison of mutual inductance of two pairs of coils.
22. Determination of refractive index: Abbe's refractometer.
23. Measurement of e by Milliken's method
24. Determination of Planck's constant
25. Measurement of wavelength of a laser beam.
26. Characteristics of a solar cell
27. Hall probe in magnetic field measurement.
28. Computer simulation of 1 -D and 2-D lattice vibrations
29. Simulation of 3-D models of a given kind of crystal and their study
30. Computer simulation of Nuclear chain reactions and nuclear energy

TEXTBOOKS:

1. Practical Physics and Electronics, C.C. Ouseph & etal, S.Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M.N.Srnivasan & etal, Sultan Chand and Sons, 2005.
3. B.Sc. Practical Physics, C.L.Arora, S.Chand and Co., 2004.

REFERENCE BOOKS:

1. Practical Physics, G. L. Squires, Cambridge University Press, III edition, 1985.
2. A Textbook of Practical Physics, H.P. Shrivastava, ABD Publishers, 2006.
3. Experiments in Modern Physics, Adrian C. Melissinos, Academic Press, II Ed., 2003.

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(For the students admitted from the academic year 2010 - 2011)

SEMESTER : V & VI **PAPER CODE : B0221**

MAIN PAPER XXI

ELECTRONICS PRACTICALS

Choose any 20 experiments from the list given below.

LIST OF EXPERIMENTS: ***5 hours per week***

1 Power pack with two diodes, Zenor regulator and shunt capacitor filter.
2 Transistor characteristics - common base.
3 Single stage RC coupled CE amplifier - Frequency response curve.
4 Tuned collector oscillator - Frequency measurement by CRO and Frequency counter.
5 Colpitt's oscillator - Frequency measurement by CRO and Frequency counter.
6 Astable multivibrator - Using Transistor and 555 Timer- Frequency measurements
7 Clipping and Clamping circuits using diodes.
8 Emitter follower.
9 Basic Logic and Universal gates using diodes and transistors components.
10 Basic and Universal logic gates using ICs
11 JFET characteristics.
12 Two stage RC coupled amplifier and study of its frequency and feed back
13 Transistor Amplitude modulator and measurement of percentage of modulation.
14 OP-AMP characteristics (7411C) -parameter measurement
15 Basic OP-AMP circuits - Half-wave rectifier, Clipper, Clamper, Comparator,
16 OP-AMP addition, subtraction, multiplication, Integration and differentiation.
17 NAND and NOR as universal gates using ICs
18 Implementation of logic expression and their simplification
19 Arithmetic circuits using gates
20 IC Half adder and fulladder
21 Parity generator / checker
22 Multiplexers
23 Demultiplexers
24 RS, D, JK and Master Slave flip-flops
25 Shift Registers
26 Asynchronous counters using ICs
27 Diode AM detection
28 Computer simulation ionosphere and sky wave reflection
29 Addition, subtraction, division and multiplication using microprocessor.
30 Designing simple traffic light controller using a microprocessor.

TEXTBOOKS:

1. Digital electronics Practice Using Integrated Circuits, Jain R.P, Anand M.M.S, Tata McGraw-Hill, 1999.
2. Basic Electronics-A Text Lab Manual, Zbar & Malvino, Seventh Ed., McGraw-Hill , New Delhi, 2005.

REFERENCE BOOKS:

1. Electronic principles, Malvino , 6th Ed. , Tata McGraw-Hill, , New Delhi,,1999.
2. Digital Electronics Experiments Manual: Principles & Applications, Tokheim, 7th ed. McGraw-Hill, 2007.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)

SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : III **PAPER CODE : A0281**

ALLIED PAPER I

ALLIED PHYSICS - I

(FOR CHEMISTRY MAIN)

UNIT - I: *12 hours*

Moment of inertia - radius of gyration - parallel and perpendicular axis theorem -calculation of moment of inertia of (a) ring (b) disc (c) solid spheres – reduced mass – moment of inertia of diatomic molecule - angular momentum and torque and relation between them

Ultrasonics – production by magnetostriction - production and detection by piezoelectric methods - properties of ultrasonic waves and applications.

UNIT - II: *14 hours*

Young's modulus - bulk modulus - rigidity modulus and Poisson's ratio - expression for bending moment of a beam in terms of curvature of neutral axis - determination of Young's modulus of a rectangular bar - non-uniform bending - pin and microscope method with theory – torsion - expression for couple per unit twist - determination of rigidity modulus - torsion pendulum.

UNIT - III: *14 hours*

Streamline and turbulent motion - equation of continuity - Viscosity of liquids – Poiseulle's formula- determination of viscosity : Oswald viscometer.

Surface tension and surface energy - interfacial surface tension - experimental determination of surface tension by drop weight method - variation of surface tension with temperature - Jaeger's method.

UNIT - IV: *16 hours*

Newton's law of cooling - determination of specific heat of liquid - specific heat capacity of gases - ratio of specific heat capacities - determination of the ratio of specific heats of gases - Clement and Desorme's method.

Thermal conductivity of a bad conductor - Lee's disc method - determination of thermal conductivity by Forbe's method.

Black body radiation - Stefan's law – black body spectrum – Wein's law, Rayleigh Jeans law and Planck's law (qualitative ideas).

UNIT - V: *16 hours*

Interference - method of producing coherent sources - Fresnel's biprism - Newton's rings by reflected light - Interferometers - Michelson's Interferometer -wavelength determination - Jamin's refractometer.

Diffraction - Fresnel's diffraction - Fraunhoffer diffraction - half-period zones -rectilinear propagation of light.

Polarization - optical activity - specific rotatory power –Polarimeter: Laurent's half shade ploarimerter.

TEXTBOOKS:

1. Allied Physics, R.Murugeasn, S.Chand & Co., 2005.
2. A Textbook of Allied Physics, Dr.Sabesan and etal, - VoI-I and Vol-II, 1998.
3. Ancillary Physics, Kamalakannan and others, S. Viswanathan, 2000.

REFERENCE BOOKS:

1. Fundamentals of Physics, Halliday, Resnik, Walker, 5th Ed. Asian Books Pvt. Ltd., 2002.
2. Allied Physics, G.Ravichandran, Padmapriya Publications, 2007.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)

SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : IV **PAPER CODE : A0282**

ALLIED PAPER II

ALLIED PHYSICS – II

(FOR CHEMISTRY MAIN)

UNIT - I: *12 hours*

Spontaneous and Stimulated emission – LASER - population inversion – pumping - active medium - characteristics of lasers - principle and working of semiconductor laser - concept of tunable dye laser – application of lasers in chemistry and environmental study.

UNIT - II: *16 hours*

Electric filed and potential - Gauss's law with proof – Electric intensity and potential due to a uniformly charged hollow conductor at a point outside, on the surface and inside a spherical conductor - capacity of a parallel plate condenser with and without a dielectric slab - Biot & Savart's law - field along the axis of a circular coil carrying current - force on current carrying conductor placed in a magnetic field - theory of moving coil galvanometer. Maxwell Equations (basic ideas).

UNIT - III: *16 hours*

Breakdown of classical mechanics – de Broglie Concept - Matter waves - wave and group velocity Davison-Germer experiment– electron microscope - Heisenberg uncertainty principle - thought experiment.

Particle accelerator - linear accelerator - particle detectors - Wilson cloud chamber - nuclear models - Liquid drop model – nuclear reaction – Q value of the reaction – conservation laws - Fission reaction - nuclear reactors – Fusion – stellar energy.

UNIT - IV: *14 hours*

Dia, para and ferro magnetic materials – characteristics - Super conductivity - persistent current – Meissner effect – Type-I and Type –II superconductors – Josephson's effect – application of superconductors.

Liquid crystals – nematic, cholestric, and smectic crystals – uses in display applications. Nano materials – properties – uses.

UNIT - V: *14 hours*

Half and full waves Rectifiers (qualitative ideas)- Transistor – CE characteristics – single stage RC coupled amplifier-–frequency response (without derivation) – bandwidth - feed back in amplifiers - basic principles of an oscillator - Hartley oscillator- working (without derivation).

Logic gates –AND & OR gates using diodes – NOT gate using Transistor - NAND and NOR as universal gates.

TEXTBOOKS:

1. Allied Physics, R.Murugeasn, S.Chand & Co., 2005.
2. Ancillary Physics, Ponnusamy and others, 1998.
3. Ancillary Physics, Kamalakannan and others, S. Viswanathan, 2000.

REFERENCE BOOKS:

1. Fundamentals of Physics, Halliday, Resnik, Walker, 5th Ed. Asian Books Pvt. Ltd., 2002.
2. Allied Physics, G.Ravichandran, Padmapriya Publications, 2007.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)

SYLLABUS FOR THE B. Sc (PHYSICS)

(For the students admitted from the academic year 2010 - 2011)

SEMESTER : III & IV **PAPER CODE : A0283**

ALLIED PAPER III

ALLIED PHYSICS PRACTICALS

(FOR CHEMISTRY MAIN)

Choose any 14 experiments from the list given below.

LIST OF EXPERIMENTS: *2 hours per week*

1. Young's modulus - Non-Uniform bending - Pin & Microscope
2. Rigidity modulus - Torsional oscillations without masses.
3. Comparison of coefficient of viscosity.
4. Surface tension of a liquid and interfacial surface tension by drop weight method.
5. Spectrometer - Refractive index of a liquid - Hollow prism.
6. Spectrometer -Grating - N determination by normal incidence method.
7. Spectrometer -Grating - wavelength determination by minimum deviation method.
8. Newton's Rings- determination of focal length of plano convex lens
9. Thermal conductivity of a bad conductor - Lee's disc method
10. Post office box - laws of resistance and specific resistance.
11. Sonometer – verification I and II laws of transverse vibration in strings.
12. Melde's apparatus - Determination of frequency.
13. Meter Bridge - Temperature coefficient of the material of a coil of wire.
14. Potentiometer- calibration of low range voltmeter (o - 1.5 V).
15. Potentiometer - calibration of ammeter (0-1.5 amps).
16. Figure of merit of a periodic moving coil galvanometer.
17. Field along the axis of the circular coil carrying current - Determination of B_H.
18. Newton's law of cooling and specific heat determination
19. Frequency measurement by forming Lissajous figures.
20. Determination of Wavelength of the laser beam.
21. Study of Half wave rectifier.
22. Transistor characteristics - CE mode – Input and transfer characteristics.
23. Basic Logic gates using discrete components.
24. Universal logic gates using ICs.
25. Computer simulation of Nuclear Fission, Chain reaction

TEXTBOOKS:

1. Practical Physics and Electronics, C.C. Ouspe & etal, S.Visawanathan Publishers.
2. Practical Physics, M.N.Srnivasan & etal, Sultan Chand and Sons, 2005.

REFERENCE BOOKS:

1. Practical Physics, G. L. Squires, Cambridge University Press, III edition, 1985.
2. A Textbook of Practical Physics, H.P. Shrivastava, ABD Publishers, 2006.